FTA ALTERNATIVES ANALYSIS
DRAFT/FINAL ENVIRONMENTAL IMPACT STATEMENT

TASK 6
EXISTING CONDITIONS REPORT

STATE PROJECT 302-008



APPENDIX G

TRAIN SIMULATION REPORT FOR THE BASELINE TRAIN PERFORMANCE MODEL

DRAFT

TRAIN SIMULATION

REPORT

For

Baseline Train Performance Model

For

Danbury Branch Improvement Program

AA/EIS

April, 2009

Table of Contents

Appendices

1. Train Simulation Output Summary, A-1
2. Train Simulation Output Summary, A-2
3. Train Simulation Output Summary ,B-1
4. Train Simulation Output Summary, B-2
5. Train Simulation Output Summary, C-1
6. Train Simulation Output Summary, C-2
7. Traction Effort Curve P32AC - DM
8. Station Dwell Times (email)
9. Report of the January 12, 2009 meeting

1.0 EXECUTIVE SUMMARY

This report summarizes the findings of base case condition and train simulation on the existing track alignment between South Norwalk and New Milford, Connecticut. The report discusses the initial baseline development and a revised baseline that addresses MNR directions presented at the review meeting held on January 12, 2009. The objective of this initial train simulation is to create a model of the train consist and the track alignment and to compare the runtimes against the MNR schedule. The latest public schedule shows trip times between Danbury and South Norwalk of 53 minutes for the inbound trip and 55 minutes for the outbound.

The simulation includes end-to-end train run, stopping at each passenger station, for the outbound and inbound directions, except at Georgetown. The overall alignment is approximately 40 miles in each direction, is at-grade with a short tunnel section and twelve (12) passenger stations, including one planned at Georgetown. The study train consist includes five (5) coach cars type MNR 6300, a cab car type MNR 6300 at the end, and MNR Loco P32 Diesel mode in a push-pull configuration.

The analysis was conducted using Railsim Version 7 software. Specifically, the module used in the analysis was the Train Performance Calculator (TPC).

Initial Baseline

The overall runtime including dwells for the outbound direction between South Norwalk and Danbury is 1 hour 4 minutes 49 seconds or about 65 minutes. For the inbound direction, Danbury to South Norwalk the trip is 59 minutes 3 seconds, say 59 minutes. The station-to-station runtimes are included in the summary sheets A-1 and A-2 in the Appendix. All criteria and input parameters are described in the subsequent sections. The analysis suggests that the simulated runtimes are longer than the schedule; and the deviation may be attributed to the assumed dwell times and/or the wheel to rail adhesion coefficient rate of 6% assumed instead of normal adhesion of 15%.

A draft report discussing the initial baseline development was prepared and a meeting held with Metro North on January 12, 2009 at which directions were given that would be followed in preparing a revised baseline.

Revised baseline

Using the 15% adhesion coefficient that reflects normal rail conditions the runtime between Danbury and South Norwalk including dwells for the outbound direction, from South Norwalk is 58 minutes 35 seconds, and for the inbound direction, to South Norwalk) is 57 minutes 31 seconds. The four (4) revised baseline station-to-station runtimes are included in the summary sheets B-1, B-2, C-1, and C-2 in the Appendix. All criteria and input parameters are described in the subsequent sections.

The analysis suggests that these revised simulated runtimes are about 6% longer than the schedule. and the deviation may be attributed to the assumed dwell times.

Additionally, the runtime utilizing wheel to rail adhesion coefficient rate of 15% is about 10% shorter than that using 6% adhesion coefficient, in the same direction.

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2.0 SCOPE OF WORK

The work was authorized as part of the Danbury Branch Phase II Alternatives Analysis / EIS. The initial task 6.4 is to create a train model and evaluate runtimes for baseline run on the existing branch plus the extension from Danbury to New Milford. The initial parameters for the scope were discussed and agreed to between ConnDOT, MNR and URS at a meeting held on April 21, 2008.

It was initially agreed that the simulation would include:

- Operation on the Danbury branch and New Milford extension starting at South Norwalk Station
- Low adhesion coefficient of 6% for diesel locomotive and 4% for electric Multiple unit (EMU) trains
- Alignment characteristics based on available track charts
- Based on runtimes from the simulation, operation scenarios would be developed for various alternatives.

Some of the parameters were further modified at the January 12, 2009 meeting as stated above in Section 1.0. The revised baseline would incorporate the following:

- Use of new tractive-effort curve (OEM curve) for P32AC-DM locomotive provided by MNR
- Revise dwell times for each station based on MNR input; add 30 seconds for locomotive acceleration
- Calculate runtimes for both 6% and 15% adhesion coefficient in each direction
- Ignore “Calculated Curve Speed “ in the TPC Program

In addition to the above, the planned Georgetown Station stop was ignored in the revised calculations to more accurately compare with current operation.

3.0 CRITERIA AND SYSTEM DESCRIPTION

- The analysis is based on Metro-North Vehicle Design Criteria and existing alignments and operating speeds. It includes the input parameters listed in the following sub-sections and the base alignment conditions.

3.1 Vehicle Criteria

Diesel Locomotive: MNR P 32 Diesel

- Empty weight 274,400 lbs
- Initial / Maximum Acceleration 1.5 / 2.0 mphps
- Maximum Speed 80 mph
- Auxiliary Power 29 kW
- Maximum Adhesion 6% / 15%
- Tractive Effort See attached curve and add 30 seconds to each station dwell time to approximate engine loading

Passenger Coach: MNR 6300

- Empty weight 99,000 lbs
- Passenger Weight (70 passengers @ 150 lbs)

  Per coach 10,500 lbs
- Vehicle Auxiliary Power 50 kW

Cab Car: MNR 6300

- Empty weight 105,000 lbs
- Passenger Weight (70 passengers @ 150 lbs) 10,500 lbs
- Vehicle Auxiliary Power 50 kW

3.2 Station Stop and Dwell Times

There are a total of twelve (12) passenger stations along the route from South Norwalk to New Milford inclusive. In the initial baseline, a dwell time of 60 seconds was assumed for each station. For the revised baseline, dwell times are from MNR (see station dwell times (email) in the Appendix). Danbury Branch stations are; South Norwalk, Merritt 7, Wilton, Cannondale, Georgetown (planned / skipped stop),

Branchville, Redding, Bethel, and Danbury. Three (3) stations; North Danbury, Brookfield, and New Milford are included as proposed in this study.

3.3 Alignment and Operating Speeds

The analysis is based on alignment, operating speeds, and station location data obtained from existing MNR and HRRC track charts and ConnDOT planimetric maps and aerial photogrametry.

The Danbury Branch begins at South Norwalk and extends northerly to Danbury. It is owned by ConnDOT and operated by Metro North Commuter RR. There is existing rail passenger service with a maximum track speed of 50 MPH. North of Danbury to New Milford, the track is owned and operated by the Housatonic RR (HRRC). Rail service is freight only with maximum speed of 25MPH.

Physical Condition Inputs

- Two segments were created for the simulation, #01 running South to North (inbound) and #02 running North to South (outbound) between the east side of South Norwalk Station and MP 13 of the Berkshire Line.
- The simulated line is comprised of sections of existing lines. These include the New Haven Line (Sta. 1485+13 to Sta. 1506+67)[1], the Danbury Branch (MP 0.0 to MP 23.9, Maybrook Line MP 77.4 to MP 80.0, and the Berkshire Line MP 0.0 to MP 13).
- Total length of the segments is approximately 39.9 miles.

Grade Data

- For the New Haven Line and the Danbury Branch data was collected from the Metro North Railroad (MNR) Track Charts.
- For the section north of Danbury Phase I Report *Section 1.2.1 Overview of Existing Geometry* was used.

Curve Data

- Radius was used and was calculated using the following equation:

$$R = \frac{5730}{D}$$

Where R = radius, and D = degree of curvature.

- For calculating the radius of compound curves, the average of degrees of curvature was taken.
- MNR Curve Data Book was used for degree of curvature and lengths. These were used for the section from S. Norwalk to Danbury Sta. Starting locations were taken from planametrics.

[1] Section B – Catenary Design – Project No. 301-0054

- Data for Curves north of Danbury Station were taken from Val. Maps and Table DNM-1 from the Feasibility Study, Danbury Branch Electrification, Phase I Report.

Platform Data

- Existing station platform length information was taken from MNR Track Charts. The planametrics maps were used to determine the platform starting locations.
- Stations north of Danbury Sta. were assumed to be 400 feet in length.

Speed Data

- 10 mph is assumed from S. Norwalk through crossovers at CP 241 and onto the Danbury Branch
- Danbury Branch line speeds were taken from MNR Railroad Track Charts.
- 10 mph is assumed from Danbury Station northerly to yard limits at "Berkshire Jct.".
- Past this point speed data was collected from Track Charts provided by Housatonic Railroad.

Tunnel Data

- The existing tunnel at MP 1.47 is assumed to be Box type and 400 feet in length.

4.0 SIMULATION PROGRAM

This study was performed using the Railsim Version 7 software.

Railsim is an analytical tool for use in modeling rail systems. It simulates rail systems and the interaction of trains, the physical wayside elements, and the operation of single trains along the alignment to predict system capacities and parameters.

4.1 Train Performance Calculator

The Train Performance Calculator (TPC) simulates a single train on the rail alignment and is the first step in the analysis. Input data to this program include detailed grade, curve, and speed restrictions, along with a suitable model of the vehicle (i.e., weight, performance limitations, and propulsion system characteristics).

The program performs a discrete time simulation; the train position and speed are updated at very small time intervals during the course of the simulation.

Output from the train simulation includes time, distance, speed and acceleration. This information is stored in a database for subsequent use by other program modules as required. The program also outputs other data including distance traveled, average speed, station-to-station run times, and energy consumption.

4.2 Train Performance Calculation & Validation

Results from the TPC have the following runtimes between Danbury and South Norwalk:

Initial Baselines

- Run A-1, Outbound with 6% adhesion coefficient; 64 minutes 49 seconds.
- Run A-2, Inbound with 6% adhesion coefficient; 59 minutes 3 seconds

Revised Baselines

- Run B-1, Outbound direction, Skip Georgetown stop, and 6% adhesion coefficient 68 minutes 51 seconds
- Run B-2, Inbound direction, Skip Stop at Georgetown, and 6% adhesion coefficient - 63 minutes 51 seconds with dwells
- Run C-1, Outbound direction, skip stop at Georgetown, and 15% adhesion coefficient – 58 minutes 35 seconds
- Run C-2, Inbound direction, skip stop at Georgetown, and 15% adhesion coefficient – 57 minutes 31 seconds

The present public train schedule shows trip times of 55 minutes and 53 minutes for outbound and inbound respectively. Thus the calculated times for C-1 and C-2 exceed the schedule by about 3 and 4 minutes respectively and can be considered representative of the existing Danbury Branch peak service.

The activity discussed in this report and the outputs B-1, B-2, C-1, and C-2 satisfy the requirements to:

- Develop a model that simulates the current base conditions on the Danbury Branch and extension to New Milford
- Train performance for the Baseline or No Build Alternative

			OB Run 6% Adhesion Coeff. (A-!)						
Station	Event	Interval Time	Elapsed Time	Distance	Average Spd.	Max. Spd.	Make Up	Peak Power	Energy Consumption
ID	State	Hrs:Min:Sec	Hrs:Min:Sec	Feet	Mph	Mph	Percent	Gallons/hour	Gallons
South Norwalk	Departure	0:00:00	0:00:00	0			N.A.		0
Merritt 7	Arrival	0:11:25	0:11:25	20789	20.7	40	0	124.21	9.40957
Merritt 7	Departure	0:01:00	0:12:25	0	19.04		0	21.23	0.35436
Wilton	Arrival	0:06:32	0:18:56	16585	28.85	50	0	150.01	8.7839
Wilton	Departure	0:01:00	0:19:56	0	25.02		0	21.23	0.35436
Cannondale	Arrival	0:05:33	0:25:30	12320	25.19	48.49	0	146.11	7.31308
Cannondale	Departure	0:01:00	0:26:30	0	21.35		0	21.23	0.35436
Georgetown	Arrival	0:06:38	0:33:08	15001	25.71	50	0	150.01	8.90388
Georgetown	Departure	0:01:00	0:34:08	0	22.34		0	21.23	0.35436
Branchville	Arrival	0:02:45	0:36:53	3354	13.83	30.28	0	99.17	2.32161
Branchville	Departure	0:01:00	0:37:53	0	10.15		0	21.23	0.35436
Redding	Arrival	0:11:39	0:49:33	22635	22.06	50	0	149.5	12.13635
Redding	Departure	0:01:00	0:50:33	0	20.32		0	21.23	0.35436
Bethel	Arrival	0:06:50	0:57:22	21725	36.16	50	0	149.59	7.20273
Bethel	Departure	0:01:00	0:58:22	0	31.54		0	21.23	0.35436
Danbury	Arrival	0:06:27	1:04:49	12174	21.43	43.38	0	132.87	5.63669
Danbury	Departure	0:01:00	1:05:50	0	18.56		0	21.23	0.35436
North Danbury	Arrival	0:20:28	1:26:17	17701	9.83	10	0	46.59	7.88172
North Danbury	Departure	0:01:00	1:27:17	0	9.37		0	21.23	0.35436
Brookfield	Arrival	0:11:39	1:38:57	23060	22.49	25	0	85.54	7.92802
Brookfield	Departure	0:01:00	1:39:56	0	20.71		0	21.23	0.35436
New Milford	Arrival	0:19:09	1:59:06	34571	20.51	25	0	85.13	8.08512
Run Total (With Dwells)		1:59:06		199915	19.08	50	0	150.01	89.14631
Run Total (Without Dwells)		1:49:06		199915	20.82	50	N.A.	150.01	85.60268

			IB Run 6% Adhesion Coeff. (A-2)						
Station	Event	Interval Time	Elapsed Time	Distance	Average Spd.	Max. Spd.	Make Up	Peak Power	Energy Consumption
ID	State	Hrs:Min:Sec	Hrs:Min:Sec	Feet	Mph	Mph	Percent	Gallons/hour	Gallons
New Milford	Departure	0:00:00	0:00:00	0			N.A.		0
Brookfield	Arrival	0:19:10	0:19:10	34571	20.49	25	0	85.61	13.08031
Brookfield	Departure	0:01:00	0:20:10	0	19.48		0	21.23	0.35436
North Danbury	Arrival	0:11:38	0:31:48	23060	22.52	25	0	85.55	6.55229
North Danbury	Departure	0:01:00	0:32:48	0	20.74		0	21.23	0.35436
Danbury	Arrival	0:20:13	0:53:02	17556	9.87	10	0	46.5	11.02491
Danbury	Departure	0:01:00	0:54:02	0	9.4		0	21.23	0.35436
Bethel	Arrival	0:06:35	1:00:37	12344	21.31	46.35	0	140.5	4.77738
Bethel	Departure	0:01:00	1:01:37	0	18.5		0	21.23	0.35436
Redding	Arrival	0:07:22	1:08:58	21470	33.15	50	0	149.63	8.14529
Redding	Departure	0:01:00	1:09:58	0	29.18		0	21.23	0.35436
Branchville	Arrival	0:10:05	1:20:03	22720	25.6	50	0	149.42	8.42835
Branchville	Departure	0:01:00	1:21:03	0	23.29		0	21.23	0.35436
Georgetown	Arrival	0:02:07	1:23:10	3499	18.81	35.1	0	111.44	1.97565
Georgetown	Departure	0:01:00	1:24:10	0	12.77		0	21.23	0.35436
Cannondale	Arrival	0:04:42	1:28:52	14771	35.73	50	0	149.65	3.65653
Cannondale	Departure	0:01:00	1:29:52	0	29.46		0	21.23	0.35436
Wilton	Arrival	0:04:20	1:34:12	12490	32.73	50	0	149.57	4.25924
Wilton	Departure	0:01:00	1:35:12	0	26.6		0	21.23	0.35436
Merritt 7	Arrival	0:05:13	1:40:25	16585	36.16	50	0	149.67	4.27602
Merritt 7	Departure	0:01:00	1:41:25	0	30.34		0	21.23	0.35436
South Norwalk	Arrival	0:11:41	1:53:05	21299	20.73	42.33	0	130.15	7.24844
Run Total (With Dwells)		1:53:05		200365	20.13	50	0	149.67	76.96803
Run Total (Without Dwells)		1:43:05		200365	22.09	50	N.A.	149.67	73.4244

Base Run OB 6% Adhesion Coeff. New TE (Run B-1)

Station ID	Event State	Interval Time Hrs:Min:Sec	Elapsed Time Hrs:Min:Sec	Distance Feet	Average Spd. Mph	Max. Spd. Mph	Make Up Percent	Peak Power Gallons/hour	Energy Consumption Gallons
South Norwalk	Departure	0:00:00	7:00:00 AM	0			N.A.		0
Merritt 7	Arrival	0:11:25	7:11:25 AM	20789	20.7	40	0	124.21	9.40957
Merritt 7	Departure	0:02:30	7:13:55 AM	0	16.98		0	21.23	0.88502
Wilton	Arrival	0:06:32	7:20:27 AM	16585	28.85	50	0	150.01	8.7839
Wilton	Departure	0:02:30	7:22:57 AM	0	20.87		0	21.23	0.88502
Cannondale	Arrival	0:05:33	7:28:30 AM	12320	25.19	48.49	0	146.11	7.31308
Cannondale	Departure	0:01:30	7:30:00 AM	0	19.84		0	21.23	0.53125
Georgetown	Pass	0:06:18	7:36:18 AM	15001.88		50	N.A.		9.31641
Branchville	Arrival	0:01:07	7:37:24 AM	3353.12	28.16	50	0	150.01	0.83674
Branchville	Departure	0:02:30	7:39:54 AM	0	21.05		0	21.23	0.88502
Redding	Arrival	0:11:39	7:51:34 AM	22635	22.06	50	0	149.5	12.13635
Redding	Departure	0:01:30	7:53:04 AM	0	19.55		0	21.23	0.53125
Bethel	Arrival	0:06:50	7:59:53 AM	21725	36.16	50	0	149.59	7.20273
Bethel	Departure	0:02:30	8:02:23 AM	0	26.47		0	21.23	0.88502
Danbury	Arrival	0:06:27	8:08:51 AM	12174	21.43	43.38	0	132.87	5.63669
Danbury	Departure	0:01:30	8:10:21 AM	0	17.39		0	21.23	0.53125
North Danbury	Arrival	0:20:28	8:30:49 AM	17701	9.83	10	0	46.59	7.88172
North Danbury	Departure	0:01:30	8:32:19 AM	0	9.16		0	21.23	0.53125
Brookfield	Arrival	0:11:39	8:43:58 AM	23060	22.49	25	0	85.54	7.92802
Brookfield	Departure	0:01:30	8:45:28 AM	0	19.92		0	21.23	0.53125
New Milford	Arrival	0:19:09	9:04:37 AM	34571	20.51	25	0	85.13	8.08512
Run Total (With Dwells)		2:04:37		199915	18.23	50	0	150.01	90.72668
Run Total (Without Dwells)		1:47:07		199915	21.21	50	N.A.	150.01	84.53034

Base Run IB 6% Adhesion Coeff. New TE (Run B-2)

Station ID	Event State	Interval Time Hrs:Min:Sec	Elapsed Time Hrs:Min:Sec	Distance Feet	Average Spd. Mph	Max. Spd. Mph	Make Up Percent	Peak Power Gallons/hour	Energy Consumption Gallons
New Milford	Departure	0:00:00	7:00:00 AM	0			N.A.		0
Brookfield	Arrival	0:19:10	7:19:10 AM	34571	20.49	25	0	85.61	13.08031
Brookfield	Departure	0:01:30	7:20:40 AM	0	19.01		0	21.23	0.53125
North Danbury	Arrival	0:11:38	7:32:18 AM	23060	22.52	25	0	85.55	6.55229
North Danbury	Departure	0:01:30	7:33:48 AM	0	19.95		0	21.23	0.53125
Danbury	Arrival	0:20:13	7:54:02 AM	17556	9.87	10	0	46.5	11.02491
Danbury	Departure	0:01:30	7:55:32 AM	0	9.18		0	21.23	0.53125
Bethel	Arrival	0:06:35	8:02:07 AM	12344	21.31	46.35	0	140.5	4.77738
Bethel	Departure	0:02:30	8:04:37 AM	0	15.44		0	21.23	0.88502
Redding	Arrival	0:07:22	8:11:58 AM	21470	33.15	50	0	149.63	8.14529
Redding	Departure	0:01:30	8:13:28 AM	0	27.54		0	21.23	0.53125
Branchville	Arrival	0:10:05	8:23:33 AM	22720	25.6	50	0	149.42	8.42835
Branchville	Departure	0:02:30	8:26:03 AM	0	20.51		0	21.23	0.88502
Georgetown	Pass	0:01:46	8:27:50 AM	3501.23		42.43	N.A.		2.337
Cannondale	Arrival	0:03:50	8:31:40 AM	14768.77	37.04	50	0	149.51	2.08294
Cannondale	Departure	0:01:30	8:33:10 AM	0	29.22		0	21.23	0.53125
Wilton	Arrival	0:04:20	8:37:30 AM	12490	32.73	50	0	149.57	4.25924
Wilton	Departure	0:02:30	8:40:00 AM	0	20.76		0	21.23	0.88502
Merritt 7	Arrival	0:05:13	8:45:13 AM	16585	36.16	50	0	149.67	4.27602
Merritt 7	Departure	0:02:30	8:47:43 AM	0	24.44		0	21.23	0.88502
South Norwalk	Arrival	0:11:41	8:59:23 AM	21299	20.73	42.33	0	130.15	7.24844
Run Total (With Dwells)		1:59:23		200365	19.07	50	0	149.67	78.4085
Run Total (Without Dwells)		1:41:53		200365	22.35	50	N.A.	149.67	72.21216

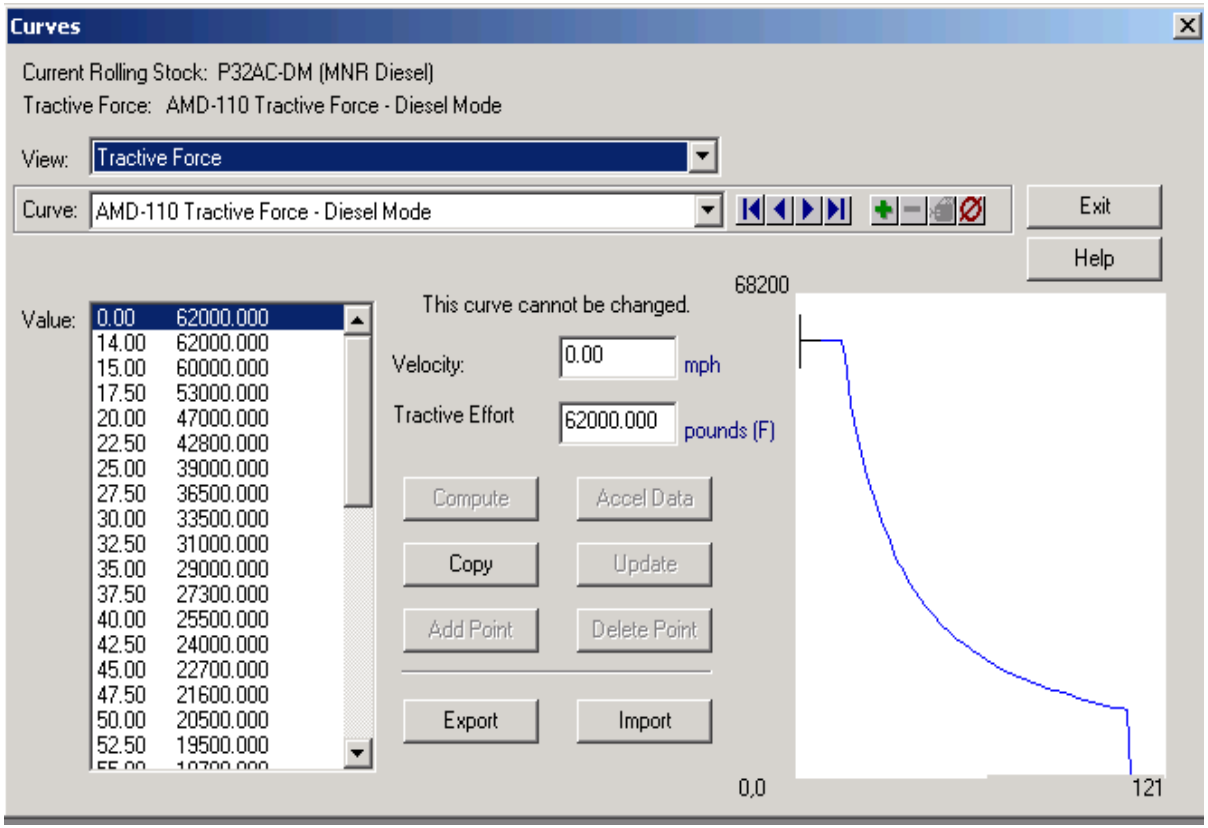
Base Run OB 15% Adhesion Coeff. New TE (Run C-1)

Station ID	Event State	Interval Time Hrs:Min:Sec	Elapsed Time Hrs:Min:Sec	Distance Feet	Average Spd. Mph	Max. Spd. Mph	Make Up Percent	Peak Power Gallons/hour	Energy Consumption Gallons
South Norwalk	Departure	0:00:00	7:00:00 AM	0			N.A.		0
Merritt 7	Arrival	0:10:55	7:10:55 AM	20789	21.64	40	0	169.79	9.33981
Merritt 7	Departure	0:02:30	7:13:25 AM	0	17.61		0	21.23	0.88502
Wilton	Arrival	0:04:51	7:18:16 AM	16585	38.9	50	0	169.75	8.40537
Wilton	Departure	0:02:30	7:20:46 AM	0	25.66		0	21.23	0.88502
Cannondale	Arrival	0:04:06	7:24:52 AM	12320	34.12	50	0	169.65	7.43085
Cannondale	Departure	0:01:30	7:26:22 AM	0	24.99		0	21.23	0.53125
Georgetown	Arrival	0:04:29	7:30:51 AM	15001	38.01	50	0	169.57	8.34302
Georgetown	Departure	0:00:00	7:30:51 AM	0	38.01		0	21.23	0.00059
Branchville	Arrival	0:01:44	7:32:35 AM	3354	22.09	40.99	0	169.67	2.65548
Branchville	Departure	0:02:30	7:35:05 AM	0	9.02		0	21.23	0.88502
Redding	Arrival	0:07:15	7:42:20 AM	22635	35.45	50	0	169.55	11.8817
Redding	Departure	0:01:30	7:43:50 AM	0	29.37		0	21.23	0.53125
Bethel	Arrival	0:06:27	7:50:17 AM	21725	38.29	50	0	169.88	7.26266
Bethel	Departure	0:02:30	7:52:47 AM	0	27.59		0	21.23	0.88502
Danbury	Arrival	0:05:48	7:58:35 AM	12174	23.84	50	0	169.69	6.02855
Danbury	Departure	0:01:30	8:00:05 AM	0	18.94		0	21.23	0.53125
North Danbury	Arrival	0:20:17	8:20:23 AM	17701	9.91	10.4	0	85.75	7.83005
North Danbury	Departure	0:01:30	8:21:53 AM	0	9.23		0	21.23	0.53125
Brookfield	Arrival	0:10:58	8:32:51 AM	23060	23.88	25	0	169.58	7.69838
Brookfield	Departure	0:01:30	8:34:21 AM	0	21.01		0	21.23	0.53125
New Milford	Arrival	0:18:52	8:53:13 AM	34571	20.82	25	0	169.8	8.01826
Run Total (With Dwells)		1:53:13		199915	20.07	50	0	169.88	91.09107
Run Total (Without Dwells)		1:35:43		199915	23.73	50	N.A.	169.88	84.89414

Base Run IB 15% Adhesion Coeff. New TE (C-2)

Station ID	Event State	Interval Time Hrs:Min:Sec	Elapsed Time Hrs:Min:Sec	Distance Feet	Average Spd. Mph	Max. Spd. Mph	Make Up Percent	Peak Power Gallons/hour	Energy Consumption Gallons
New Milford	Departure	0:00:00	7:00:00 AM	0			N.A.		0
Brookfield	Arrival	0:18:59	7:18:59 AM	34571	20.7	25	0	174.11	13.02329
Brookfield	Departure	0:01:30	7:20:29 AM	0	19.18		0	21.23	0.53125
North Danbury	Arrival	0:10:58	7:31:27 AM	23060	23.89	25	0	174.1	6.32725
North Danbury	Departure	0:01:30	7:32:57 AM	0	21.01		0	21.23	0.53125
Danbury	Arrival	0:20:07	7:53:04 AM	17556	9.92	11.19	0	90.23	11.01574
Danbury	Departure	0:01:30	7:54:34 AM	0	9.23		0	21.23	0.53125
Bethel	Arrival	0:06:00	8:00:33 AM	12344	23.39	50	0	181.94	4.97531
Bethel	Departure	0:02:30	8:03:03 AM	0	16.51		0	21.23	0.88502
Redding	Arrival	0:06:28	8:09:31 AM	21470	37.76	50	0	181.87	8.39679
Redding	Departure	0:01:30	8:11:01 AM	0	30.64		0	21.23	0.53125
Branchville	Arrival	0:07:02	8:18:03 AM	22720	36.73	50	0	182.02	8.19922
Branchville	Departure	0:02:30	8:20:33 AM	0	27.1		0	21.23	0.88502
Georgetown	Pass	0:01:16	8:21:49 AM	3505.09		50	N.A.		2.92125
Cannondale	Arrival	0:03:49	8:25:38 AM	14764.91	40.86	50	0	181.97	1.51311
Cannondale	Departure	0:01:30	8:27:08 AM	0	31.54		0	21.23	0.53125
Wilton	Arrival	0:03:57	8:31:05 AM	12490	35.9	50	0	181.97	4.45648
Wilton	Departure	0:02:30	8:33:35 AM	0	21.99		0	21.23	0.88502
Merritt 7	Arrival	0:04:42	8:38:17 AM	16585	40.06	50	0	181.95	4.27311
Merritt 7	Departure	0:02:30	8:40:47 AM	0	26.16		0	21.23	0.88502
South Norwalk	Arrival	0:11:18	8:52:05 AM	21299	21.43	43.2	0	181.73	7.39745
Run Total (With Dwells)		1:52:05		200365	20.32	50	0	182.02	78.69533
Run Total (Without Dwells)		1:34:35		200365	24.07	50	N.A.	182.02	72.49899

MNR Genesis Diesel TE Curve: Manufacturers Spec (1 of 3)



Station Dwell Times

Station	Station Dwell (seconds)	Engine Loading (seconds)	Total Dwell (seconds)
Danbury (Inbound Only)	0	30	30
Bethel	120	30	150
Redding	60	30	90
Branchville	120	30	150
Cannondale	60	30	90
Wilton	120	30	150
Merrit 7 (low level platform)	120	30	150
Merrit 7 (high level platform)	60	30	90

URS

MEETING MINUTES

RE: Danbury Branch Phase II Alternatives Analysis & EIS

DESCRIPTION: Baseline Train Performance Model

MEETING DATE: Monday Jan. 12, 2009, 11:00 AM

LOCATION: 347 Madison Ave.
New York, NY

ATTENDEES:

NAME	ORGANIZATION	EMAIL
Ed Lydecker	Metro-North	Lydecker@mnr.org
John Kesich	Metro-North	Kesich@mnr.org
David Chase	URS	David_Chase@urscorp.com
Dan Khan	URS – Washington Division	Dan.Khan@wgint.com

As part of the Danbury Branch Study, URS has prepared a baseline condition TPC model. Various runs were performed using the model and different assumptions discussed in our meeting last April. In particular, the simulations considered a base vehicle model for the diesel locomotive and the train consists along with underlying assumptions for adhesion coefficient, dwell time and passenger counts. A draft report of our work was presented and is attached.

Results of the discussions are:

- The preliminary TPC runs give a trip time up to 10 minutes over the schedule.
- MNR advised that URS should ignore the calculated curve speed element of the TPC program.
- There may be an issue with the tractive effort curve used by URS, and that was provided by MNR. The same curve is also included with Railsim Version 7 that URS is using for its TPS runs. MNR advised that URS should use the OEM curve and add 30 seconds to dwell time to account for the time lost in locomotive accelerating from zero speed. This will not be an issue when we do the model for electric equipment.
- Since there was some concern about the TE curve to be used, Ed Lydecker will check with SYSTRA and provide URS with the correct curve for the Genesis locomotives.
- There will now be four (4) baseline TPCs, two for each direction. For each direction there will 2 TPCs, one with a adhesion rate of 15%, considered as normal condition and a second with a 6% adhesion rate as a adverse condition as experienced in the fall with wet leaves on the rails. It is expected that when the electric equipment is modeled that there will be a significant improvement in the adverse weather condition as each axle on the whole consist will be powered.
- To develop a TPC for the through trip from New Milford to GCT, MNR will run their model between South Norwalk Station and GCT and provide the data to URS. URS will do the models between New Milford and South Norwalk and prepare the combined trip results. Dave Chase will identify the train Number(s) to be modeled.

- Ed Lydecker will confirm station dwell times to be used.
- The electric (EMU) vehicle tractive effort data to be used will be for the existing M2, 4, &6. MNR expects the new M8 cars to have similar characteristics. We will revisit this item when we start the alternate TPCs.
- The fuel consumption calculation appears to be reasonable based on MNRs average locomotive fuel usage of 2 Gallons per mile.

The following data on existing diesel hauled trains was requested by a subconsultant for the energy portion of the Danbury Study:

- What locomotive(s) and coaches are in use on the Danbury Branch (for each train)?
  The 3 through trains are 1 Genesis diesel electric/electric locomotive with 6 coaches. The shuttles are 1 BL20GH diesel electric locomotive with 3 coaches.
- Trip schedules for each train, including route segments it travels (if not entire), where do the through trains layover?
  Dave Chase will respond.
- For each train:
  Data on fuel consumption – either actual data on diesel consumption (per trip, 2-way trip, day, week) OR the manufacturer's spec for fuel consumption. Compare to calculated fuel consumption.
  MNRs average fuel consumption is 2 gallons per mile. URS will be calculating fuel consumption with the TPCs.
  How many seats on each run?
  100 seats is average per coach.

Submitted by: David Chase, URS 1-20-09 Date

Reviewed by: Stephen Gazillo, URS 1-20-09 Date

Cc: Attendees – By Email
Andrew H. Davis
J. Mark Foran
File: 10.02